SIERRA COUNTY,

NEW MEXICO

RICH
IN
MINERAL
WEALTH.

Agricultural and Pastoral Lands

SALUBRIOUS CLIMATE.

GOLD, LEAD,

SILVER, COAL,

COPPER, MARBLE.

MINERAL AND OTHER RESOURCES

—OF—

SIERRA COUNTY, NEW MEXICO

—BY—

GEO. E. ROBIN, HILLSBOROUGH, N. M.

ISSUED BY

Sierra County World's Columbian Exposition Committee.

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GENERAL FEATURES.

Sierra County, situated in the southwestern portion of New Mexico, at the intersection of the 33d parallel and the 107th west meridian, comprises an area of about 3,000 square miles, and presents an extraordinary variety of agricultural and mineral resources.

The great Rio Grande flows from north to south through its limits, and receives in this distance the tributary waters of the Cuchillo Negro, Palomas, Seco, Las Animas, Percha, Trujillo, Tierra Blanca, Berrenda, and Canada Alamosa.

Parallel with the Rio Grande are three important mountain ranges. On the west, the Black Range, an unbroken chain over 100 miles in length, constituting the continental divide and the western boundary of the county. The prominent peaks of this range attain an altitude of from 8,000 to 10,000 feet. Its slopes and valleys are covered with a thick growth of pine and other valuable timber, the dark foliage of which has given rise to its distinctive name. Numerous herds of cattle and flocks of sheep and goats find sustenance the year round in its nutritious grasses and herbs, and in its remote recesses bear, deer and small game abound.

Primitive rocks of the granitic series compose the central and higher portions of the range. Lapping on this formation, along its base and sides, are strata of quartzite, limestone and shale, faulted, pierced and disturbed by eruptions of porphyry, which have occurred at different periods and along two distinct lines parallel to the range; the first at the base, and cutting through the foothills; the second, eight to twelve miles distant, displays a series of nearly circular groups of lofty hills.

The mines occur along the eruptive lines; on the first in the form of contact veins, between shale and lime, and porphyry and lime: and on the second in the form of fissure veins in the hill groups, and blanket veins in the lower country. At Chloride and Grafton, and some other points to be mentioned, fissure veins appear also in the primitive rocks series, extending sometimes into the adjoining limestones.

East of the Rio Grande, the Sierras, Fra Christobal and Caballo, rear their lofty crests 8,000 feet above the level of the sea, and contain valuable deposits of copper, iron, lead with silver, and coal. These mineral riches have as yet only been ascertained to exist in the outcrop, and no mining of any extent has been done there. Closely contiguous, however, to the Santa Fe Railroad, these mines will in the future contribute immensely to the wealth of the county, and to the private fortune of many an enterprising miner and investor.

THE SANTA FE RAILROAD.

The Atchison, Topeka & Santa Fe Railroad passes through Sierra County, like the river, from north to south. Its distributing points are at Lake Valley for the south, and at Engel for the east, from whence well-equipped stage and freight lines penetrate to the different towns and villages of the county. The Santa Fe directory has done much to develop the resources and aid in the growth of this section by granting low rates of transportation on ores to the great smelting points of Colorado, and of Kansas City, Socorro, N. M., and El Paso, Tex. For the 740 miles from Lake Valley to Pueblo and Denver the rate is but $5.80 per ton. Some important branches and extensions are contemplated to penetrate to the most remote mining camps of this region, and it is the aim of the directory to foster and sustain, to the extent of its power, the rapid growth of the mining industry. An immediate improvement is the extension of the Lake Valley branch to Hillsborough, the county seat, which will bring the road within twelve miles of the most distant mines in the southern half of the county.

POPULATION.

The population of Sierra County, between 4,000 and 5,000, is composed of two-thirds American miners and settlers, and the remainder of the native Spanish-American people. There are no Indians resident or within 150 miles, and those only a miserable remnant, kept strictly upon an Arizona reservation. The native Mexicans are a peaceable, frugal and industrious race, and they afford an increasing source of cheap labor in mine and field.

PUBLIC SCHOOLS.

Excellent schools are maintained in the seventeen school districts of the county, under the supervision of the county school superintendent. Eight to ten months of the year is devoted to the education of children, and the teachers selected are of the very best character. The school fund has always been cherished, and commodious, substantial and handsome school houses have been built and are building. In all departments of primary education the school system of Sierra County will bear comparison with communities otherwise far more advanced.

CLIMATE.

It is not too much to say of this land of sunshine, that there exists a perpetual summer. There is but just enough of cold in the months of November and December to mark the change from summer to winter, while a fall of snow is rare, and at most does not remain upon the ground more than a few days. In the higher portions of the mountain ranges some snow is, doubtless, preserved during the colder months, and serves to maintain the summer streams. With such a winter temperature it might be expected that a very high thermometer would rule in summer, but such is not the case. From 90 to 95 degrees in the shade is the greatest heat recorded, and from 20 to 30 below freezing point the most severe cold. The altitude—4,000 to 5,000 feet—of the main portions of the region will account for these moderate extremes. In such a climate mining operations are pursued to the greatest possible advantage, and agriculture aided by irrigation has no drawbacks. The devastations of snowslides and blizzards are here unknown, and the same may be said of pneumonia, that scourge of the miners in the North.

WAGON ROADS

Of good grade, and well-maintained repair, conduct through the most important districts and reach the more notable mines. Roads from the agricultural lands enable the farmers to sell their produce in the markets of the mining towns, where they obtain prices really remunerative.

LABOR AND WAGES.

Miners earn $3 and $3.50 per day, laborers $1.50 to $2.50. Most of the labor is performed by the Mexican people, and of these there has been, with the growth of the mining industry, and from the neighboring lands of Texas and Mexico, a steady and sufficient immigration. Skilled miners from the North are constantly arriving, and so far no difficulty on the score of help has been experienced.

LUMBER, TIMBERS AND FUEL.

Sawmills located in the cañon valleys of the Black Range supply the needed lumber for buildings and use in mines, and an ample supply is kept on hand in the lumber yards of the different towns at an average price of 3 cents per foot. Heavy mining timbers for supports are delivered at the mines for from 4 to 8 cents per running foot, according to locality and proximity to timber. Fuel wood is delivered in the towns at $4 per cord. The use of coal is increasing, and with the extension of the railroad to Hillsborough will become the universal fuel for all manufacturing purposes.

MERCANTILE SUPPLIES.

In the principal towns of Hillsborough and Kingston, very large stocks of merchandise are carried, and prices will compare favorably with any other known mining districts. Smaller but complete stocks are also carried in the lesser towns of Chloride and Lake Valley, and some convenient stores are to be found where towns have not yet sprung up, but where there is mining and supplies are needed. The Sierra County Bank at Hillsborough and the Percha Bank at Kingston supply the needed facilities of financial exchange and accommodation.

MILLS AND SMELTERS.

The building of ore reduction works has kept pace with the production of the mines. Amalgamation and concentration works both are now crowded to their utmost capacity, and an enlargement in this direction must soon be made. Two smelters, or rather matte furnaces, have been erected and operated during the past year, and in this field a large expansion is probable and expected. Water supply for mills has been obtained during the dryest seasons known in the history of New Mexico, and by the aid of some engineering the available supply can be greatly increased.

THE MINING CAMPS.

The mining camps are located west of the Rio Grande and on or near the Black Range Those embraced within the cañons and foot hills of the range, and along the first line of porphyritic eruption, are Kingston, Tierra Blanca, Hermosa, Chloride and Grafton. The productive value of these is in silver with some gold, and important by-products of lead, copper and iron.

Principal in extent of mineral territory, in total output and in population, is

KINGSTON,

Eight miles west of Hillsborough, and delightfully situated in the valley of the Rio Percha, among the foot-hills of the range, at an altitude of something over 6,000 feet.

Its mines are found in the contacts of porphyry and lime, and of shale and lime, and immense bodies of rich ore have been encountered in the underlying limestone. No richer ores have been discovered anywhere on the continent, for the average value of the Kingston output since its discovery will exceed $100 per ton. The first discoveries were made here in 1883, and within a few years $6,000,000 of the surface riches had been extracted and realized. Poor men became suddenly rich, and sold their mines in most cases to corporations and companies. The surface wealth in the immediate vicinity was soon exhausted, and mining on a comprehensive scale commenced, and has since continued. Some of the most valuable claims were purchased by men who expected the bonanza period to continue indefinitely, and who did not respond to their managers' demands for money for further development of their mines. Discouraged with the sudden cessation of the rich output, they stopped operations, and have allowed the properties to remain unworked. In other cases the owners have continued exploration, and have generally been successful in finding further and deeper bodies of ore.

The most noted of the mines have been the Lady Franklin, Comstock, Superior, Bullion, Brush Heap, Illinois, Black Colt, Gypsy, Caledonia, Kangaroo, Uncle Sam, Iron King and Miner's Dream—all of which have produced amounts varying from $20,000 to $1,500,000. Ore was found in masses, and in chambers of extraordinary richness, and easily mined.

A $350,000 CHAMBER

In the Comstock mine was gutted by a few men in less than three months. Other prodigies of mineral production were common. On Carbonate Creek, four miles north of Kingston, masses of nearly pure silver were found lying upon the surface, and some wagon loads of this treasure trove were shipped.

THE ORE BELT

Of the Kingston district appears to be some miles in width and to stretch north and south from the Trujillo to beyond the North Percha, a distance of twenty miles. The main outcrop is on the west side of the belt, and most of the mines are there located. The east outcrop has, however, developed some properties of great value, among which the Gypsy stands pre-eminent. Some of the mines are advantageously located for development by tunnels, but generally shafts are sunk and levels run therefrom along the contacts. The ore is found in chimneys, chutes and pockets, and in the seams or fracture planes of the limestone. In these lime seams it is often similar in deposit to fissure veins, and continues to considerable depth. It is only of late, however, that any scientific and systematic mining has been done, or any valuable knowledge gained of the occurrence of ore and the conditions bearing thereon. Frequently ore is found cropping out at the surface, or, perhaps, but a few days' work with pick and shovel is necessary to uncover and expose it. In every case where found it is easily extracted, and the fortunate owner experiences no difficulty in realizing the value.

Extensive areas on this mineral belt have scarcely been prospected, and will in all probability prove, with development, to be valuable ground. In general this territory is held by prospectors who have not the means to do more than the annual assessment work of $100 necessary to hold their claims, and such owners are disposed to sell at very moderate prices to those who have capital for development.

VARIETIES OF ORE.

Native and brittle, sulphide, chloride and chloro-bromide ores of silver are found in combination with quartz, galena, iron, copper, zinc and talc. Very large bodies carrying silver in too small quantities to be profitable, under present conditions, are not worked or followed. The bin-oxide of manganese prevails throughout the district, is sometimes rich in silver, and when in chimneys of regular formation proves an unfailing guide to the miner in his search for the desired ores. Iron, zinc and lead deposits in unlimited quantity abound, but the time has not yet arrived when these metals can be utilized profitably.

PROCESSES OF REDUCTION

For the low grades of ore at Kingston consist of concentrating works, with capacity of about forty tons per day. The system is that of screens and jigs, allied with a Huntington mill and Gilpin County concentrators, and, while no marked success has yet been achieved, it is being constantly improved and adapted to the requirements of the ore. An iron-matte smelting furnace has been in operation for sometime, and with success. This has a capacity of about fifty tons per day, and in connection therewith is a lixiviation plant from which good results are expected.

The mines are all within a few miles and less of Kingston that have been mentioned in the foregoing. The deepest working is on the Franklin, a shaft 500 feet deep; but this mine belonging to a foreign company, is not being worked. First-class working shafts have recently been sunk on the Brush Heap, the Kangaroo and the Gypsy, and from these, and other improved workings, lower ore bodies are being reached, and it is expected that a second wave of prosperity will soon be launched.

Specimens of ore from all these mines are on exhibition in the "Miner's Cabin," and in the show-cases and cabinets of our exhibit in the Mines and Mining Building.

ADJACENT MINES

On the North Percha, eight miles north of Kingston, and close to the main range, are the Templar, Keystone, Virginian, Ingersoll, Cumberland, Sweepstakes and others, which have together produced ore to the value of nearly $1,000,000. The first three mentioned are on the same lode, a fissure in the primitive syenite rock about 50 feet in width. From many of the North Percha mines a considerable proportion of gold is obtained, and further north there are mines wherein gold becomes the principal value.

Outside of the Templar lode and the Cumberland—a rich silver contact vein—there has been no work of consequence done, and there is here a good field for intelligent investigation and investment.

SOUTH PERCHA.

A similar field is found also south of Kingston, on the South Percha Creek, where there are many mines, among which the Grey Eagle is most noted. Lead carbonate low grade ores are here abundant.

PROFITABLE INVESTMENTS.

Of this great Kingston district many authentic and well-attested instances might be given where investments of a few thousand dollars have been made which have returned a hundred fold and more to the fortunate and judicious investors. Of lesser lucky ventures the list is longer. The field is still open and to a great extent untilled, and the mining man of judgment and experience will here find profitable scope for his energy and industry.

RIO ANIMAS GOLD FIELD.

Between the north line of the Kingston belt and the Hermosa district lies the valley of the Las Animas River, and about the head waters of this stream gold has been found, with good indications of gold veins in the vicinity. These discoveries have been recently made, and their future is still prospective, but it is the opinion of experienced miners that this gulch will repay close investigation, and that mines of value will be developed there.

HERMOSA.

Thence north to Hermosa, a few miles travel brings one to a flourishing mining camp on the Rio Palomas. The name of the town signifies "beautiful," and as applied to its scenic location is emphatically correct. Romantically situated in a small park, surrounded by lofty mountains of bold and majestic outline, with its umbrageous trees, stately pines and its flowing streams, Hermosa is to the visitor a vivid picture of ideal mountain scenery.

A POOR MAN'S PARADISE.

It is the pride of the Hermosans that their mines have been developed without the aid of adventitious capital, and that as the fruit of their own labor, while many have achieved competence or wealth, all have been able to make a good living. It is essentially a camp of miners; the system in vogue with the

mine owners has been to lease their ground for a royalty on the ore extracted. The outcome has been profitable to the lessees, who in many cases have bought the mines out of their profits, and to the owners in the revenue derived and from the increased value of their properties.

PRINCIPAL MINES

Are the Pelican and Eagle group, the Palomas Chief group, Embolite, Mocking Bird, Atlantic Cable, Nana, Letter L, Argonaut, Ocean Wave, Antelope, American Flag and Homestake group. All of these named have produced considerable amounts of money, and most of them are represented in Sierra County's exhibit, in the Miner's Cabin and in show-cases and cabinets. The total output of the camp to date exceeds a million of dollars.

NATIVE SILVER

Is a prominent characteristic of Hermosa ores, and is found here in phenomenal abundance. The magnificent specimens in the show-cases surrounding the Miner's Cabin will surprise and delight the spectator, and are a confirmation of the Hermosa claim to the richest ores of this variety on the continent. The bulk of the ore shipped is of a galena base, and varies in value from $100 to $600 per ton. Some shipments have been sold for over $1,000 per ton. There is, of course, a much larger quantity of low grade ore necessarily mined and produced in the exploitation of the richer material, but this is generally a quartz ore, running from $20 to $60 per ton, and will not pay for shipping with the high freight and smelting charge on such ore. It is therefore kept on the dumps, or in the mines, for the event of more favorable conditions in the future.

CONCENTRATION AND SMELTING.

A movement toward realizing on the thousands of tons of this material in the camp has commenced. A complete concentrating plant, erected last fall, is working successfully, and turning out a product of $250 per ton average value. When the railroad penetrates to this place, or sufficiently near to insure cheap coal and coke, there will be a profitable opening for smelting processes.

Low grade lead and iron ores abound, and such must surely be of great ultimate value. In the Pelican mines there is exposed a vein of galena four feet thick, which is left in the mine and at present disregarded. Some shipments made just about paid expenses, so that with lower freight rates there will be a profit margin.

MINERAL FORMATION.

The Hermosa ores are similar to those of Kingston in their occurrence, being found on similar contacts and under like conditions. The dip of the veins is into the mountains, and consequently great depth and solidity is quickly attained. The ore is fairly regular, one seam, or pocket, leading to another, and a mine once opened becomes a certain source of wealth. It is by no means to be inferred that every working will pay immediate returns, but sooner or later a pocket and a prize reward the patient seeker. The element of luck, which constitutes so much of the fascination of mining, is here conspicuous. Some men seem without effort to be successful and attain wealth with ease; others gain little more than a livelihood. It is probable that judgment and observation have more to do with the success of the former class than is supposed.

In working along the contact a seam, or pipe, of ore will appear leading off into the lime. This will be followed as long as it holds out, or until the patience and means of the miner give out. If it widens and forms a large chamber, the miner makes big money. To one who has observed carefully the characteristics of these seams, there must be indications of promise or the reverse. A well-defined seam of apparent strength may, again, be approached by tunnel, shaft, or raise from other workings, and its exploitation be thus facilitated and made cheaper. This latter feature is coming into prominence with the better comprehension of the mines, which has been gained in the experience of the past. Long tunnels are being driven, notably on the Pelican group and the Palomas Chief, to intersect the contacts wherever practicable, and from these tunnels raises are made to the ore zones. For such work capital is required; the working miner could not afford to do the initiatory work and wait so long for his reward. In other cases deep shafts are being sunk, with cross-cut drifts therefrom to the ore bodies.

It will thus be seen that the era of the capitalist has come for these regions. The surface riches, easily reached and mined, are becoming exhausted. Further workings, and more extensive enterprises, necessitate the aid of capital. Enough has been shown to warrant this aid. Property can be cheaply acquired, and the capitalist need take no more risk in proportion than did the lessee miner at the surface, and his reward will also be proportionate. As in the great camps of the North, vast gains will be acquired by some; while others will make the inevitable losses incident to mining anywhere and everywhere. It is in this balance of profit and loss that the intrinsic value of gold and silver and of every other metal resides.

HOW TO GET THERE?

Hermosa is reached by stage from Engel, crossing the Rio Grande en route, a distance of about 60 miles, and by stage from Lake Valley via Hillsborough, about the same distance. Supplies of merchandise are received and shipments of ore made by the Engel route. Miners' wages is $3.50 per day. Altitude of town between 6,000 and 7,000 feet. Good roads to all the mines. Mail arrives and departs daily. Good stocks of merchandise are carried.

TIERRA BLANCA

Is another camp with similar formation and conditions of mining, which lies from 8 to 12 miles south of Kingston, and within 12 miles of the railroad terminus at Lake Valley. The central point of this district is in the beautiful and sheltered valley of the Rio Tierra Blanca, where a sanatarium has been established and is flourishing. The principal mines are the Log Cabin, Hornet, Ceeil, Horn Silver, Silver Belle, Silver King, Silver Tail, Victoria and Gem. The production altogether has amounted to between $100,000 and $200,000. This is a comparatively untilled field, and offers remarkable inducements. The formation being in all respects identical with the aforementioned camps, the rewards should also be of like kind. The camp awaits its first big find to be invaded by an army of miners. Prospectors are gregarious, and generally go in flocks; the success of one attracts his fellows. Scarcely twenty men, all told, own and work in the Tierra Blanca field. Of these, six are quite old men, of whom little enterprise could be expected; of the others it may be that the "Lydian airs and

soft Sicilian days" have robbed them of their native energy. But, perhaps, their philosophic content is more to be admired than censured. With little labor they secure enough of the world's goods, and why should they strive for riches and its cares?

CHLORO-BROMIDE ORE.

The ore bearing contact is noticeably marked here by the outcropping of a great quartz stratum, which is traceable for a distance of fully six miles. All of this quartz has some assay value, and in places it is so impregnated with silver as to become valuable shipping ore. To follow down and develop this hard quartz lode entails much severe work, and these miners have unanimously elected to leave it, and to burrow into the soft contiguous lime for the rich pockets that there, from time to time, reward their labor.

It is in this direction that the chloro-bromide ore is found in rich masses, and carrying a phenomenal percentage of gold. Assays of $60.000 per ton have been made, but no large quantity of such ore has been unearthed, or the camp would not have retained its present idyllic repose. The actual shipments of carload lots have varied from $100 to $500 per ton, and have mostly been marketed at El Paso, Tex.

In the Log Cabin mine a good working shaft is being sunk to a considerable depth, and from this drifts will be run to cut the quartz lode and to ascertain its value. The Horn Silver is another mine where some serious work has been attempted. Located high upon the side of Tierra Blanca Peak, this mine is attacked by a cross-cut tunnel, which intersects the quartz at several hundred feet depth, where it is found well charged with ore and will concentrate readily. A mill will be erected for that purpose by some Chicago parties who have taken the property on a conditional bond.

In the Gem and Victoria mines the quartz is good at the surface. Shipments from these mines have reached $150 per ton, all taken from a depth not exceeding twenty feet. A considerable amount of ore of this character from the Gem averaged $300 per ton. The possibilities, therefore, of this great quartz lode are immense, and the opportunities for investment under present conditions are most favorable. The mines that have produced the largest amount of very rich ore are the Log Cabin, Silver King and Silver Tail.

GOOD ROADS.

To connect with Hillsborough and Lake Valley, roads have been built. The country is heavily timbered and fairly well watered. Its nearness to the railroad gives Tierra Blanca some great advantages, and ought to add considerably to the value of the mines. Specimens from several of the mines named will be found in Sierra County's Columbian Exhibit.

RIO TRUJILLO MINES.

Between Tierra Blanca and the South Pereha flows the Rio Trujillo, whose head waters are on Sawyer's Peak, one of the highest mountains of the Black Range. A mighty cañon distinguishes the source of this stream, where the scenery in its savage grandeur rivals the most celebrated of Rocky Mountain views. In this fastness of terrific heights and declivities an extensive group of mines has been located, on two main lodes, apparently true fissure veins, passing

through granite and through eruptive formations. Some excellent ore, assaying as high as $500 per ton, has been mined, but the work is still in the prospective stage, and shipments have been inconsiderable. This country is clothed with dense and magnificent forests of pine, and abounds with all kinds of game. The approach is by a trail, but a wagon road along the bed of the creek to connect with Tierra Blanca is projected, and soon to be built. The rich ore recently discovered will probably lead to a rapid development of the mines.

The foregoing constitute the most salient points of interest along what we have designated the upper or first eruptive line, and it will now be in order to take up the second and lower line, beginning with

LAKE VALLEY,

A camp the fame of which has penetrated to the most remote parts of the world, for here was found the famous and incomparable Bridal Chamber, a cavern filled with the richest of silver ores, horn silver, or cerargerite. From this depository of nature there was extracted at a trifling expense about $3,000,000, and this discovery led to others, which, while not so valuable, have still produced their millions. Not less than $8,000,000 have been mined here within the space of a few acres, and from a depth nowhere exceeding sixty feet. The ore is found in blanket form, and is accompanied by a covering of iron-flint and manganese, overlaid by strata of lime and shale.

The history of these mines is of romantic interest. The first owners held their claims in hourly danger of the fierce Apaches, who were in their last desperate outbreaks raiding the country. They sold their claims to Philadelphia parties for $100,000, and the purchasers had worked but a few weeks when they broke into the wondrous treasure of the Bridal Chamber. An era of prodigal munificence was inaugurated, money flowed in streams, and the management entered upon a costly series of improvements and buildings, which were neither appropriate nor required. For years this profusion was continued, but when the supply of revenue seemed to suddenly cease there came a speedy crash. Profits had been distributed in dividends as fast as made, or squandered in costly and now unavailable mills and smelters. Debts rapidly accumulated, stockholders would not return any of their dividend profits, and the impression that the mines were played out prevailed. Everything went to the hammer, and a new company, organized on the wreck of the old one, took possession, and for the past six years has paid handsome dividends on a capital stock of $500,000.

But the mines of this company are not all of the district, and the limits of the great ore blanket, its direction and course, are very little better understood than when the first discoveries were made. It is a fair presumption, however, from the indications at the surface, that the blanket reaches through the adjoining hill to the east, stretches upwards to the north, and dips deeper to the south, passing under the flat on which the town of Lake Valley is built at a great depth. In the two first-named directions, ore has been found, rich and in considerable quantity. To find whether it exists below the town, the diamond drill might be effectually used. On the east side, where are the Stone Cabin, Standish and Black Prince claims, the great iron-flint blanket comes to the surface, denuded of its lime covering. In such places as the flint has been penetrated by shafts, it is found to be of great thickness, and the bottom has not been reached at fifty feet and more. Such rock is very hard to work in, and a poor

man has no chance to ascertain the value of his claim. Here, again, the diamond drill would be invaluable.

To the west of the town and of all the developed mines about a half mile, is a mountain of porphyry, and along its base the same ore is found in huge boulders, but not in definite place. Several car loads of this boulder ore have been shipped, and have brought from $40 to $60 per ton.

FLINT ORE.

The richer ores of Lake Valley are the solid horn silver, sulphide of silver, and flint carrying horn silver. Other ores are quartz impregnated with silver, and lead, both as galena and carbonate. Iron manganese ore, worth from $2 to $20, and too silicious for fluxing purposes at the smelters, is piled up in the dumps all around and about the mines. Where the value of this material is higher, and the silica is not too predominant, it can be shipped at a small profit. It is a fact that the dumps of the Lake Valley mines are composed entirely of ore. Nothing else comes out of the mines, as the great flint blanket itself is really a low-grade ore.

A fortune awaits the man who can devise a cheap process for utilizing this ore. The quantity is inexhaustible, and there are thousands upon thousands of tons already mined and surfaced.

A prominent feature at Lake Valley is the great quartzite dyke, which, starting south of here, extends north to Hillsborough, and, skirting around that camp, is still traceable many miles further.

SHIPPING FACILITIES.

The Lake Valley branch of the Santa Fe, from Nutt Station, runs through the town and fairly into the mines of the company. From one large cutting, where the ore was practically at the surface, the cars were loaded direct by the miners, and many hundreds of tons have been thus shipped. From Lake Valley to such smelting points as Socorro and El Paso, the freight rate on ore is only $2.40 and $2.80 per ton. The railroad further insures cheap supplies of all kinds and cheap fuel. Thus the Lake Valley miner is very advantageously placed, and is enabled to work on comparatively low-grade ores at a profit.

It might be expected that Lake Valley had been very thoroughly prospected and was well occupied, but such is not the case. Considering the marvelous richness of the ores, there has been a surprising lack of exploration. The country is really not yet scratched with the pick, and the workings are represented by a lot of mere assessment holes on the ground, outside the mines mentioned. These things will be changed in the future, when Lake Valley takes its place as the great mining camp, which should, and in Colorado or Montana would, have been long ago. Mining, in this portion of New Mexico at least, has so far been of a primitive order, and is of the kind which obtained in Colorado in the 60's. New Mexico's hour will strike with the Columbia Exposition, and the display of Sierra County's resources, as shown in our Miner's Cabin and elsewhere, and tabulated in this sketch, it is hoped will attract the attention and interest of the mining world.

HILLSBOROUGH,

The county seat and principal town, is the center of the gold mining district of Sierra County. It is reached by stage from Lake Valley in a two hours' ride, the distance being less than eighteen miles. The road runs along with the great quartzite dyke which is parallel with and consequent to the second eruptive line.

THE GOLD MINES

Of the Hillsborough eruptive hill group are situated from two to eight miles from the town. Good roads lead to all of the principal mines, which are fissure veins without exception. The ore veins are found on one or the other side of the intrusive porphyry dykes which cross the country from southwest to northeast. This feature insures their continuance to any depth which the science of man can reach, as an eruptive dyke must of necessity extend through the crust of the earth down to the plutonic rocks.

Hillsborough is the oldest camp in the county, the mines being first discovered in 1878, but their importance was not realized until some real mining was commenced about ten years later. The principal mines are the Bonanza, Snake, Opportunity, Richmond, Copper King group, El Oro, Wicks, Garfield, Homestake-Trippe, Happy Jack, Golden Era, Chance, Printer Boy, Bull of the Woods, Morton, Champion group, Smuggler and Ross. All of these have produced ore in considerable quantity, which has been milled and shipped to smelters. The first four named have been great mines for years past. The El Oro, Wicks, Garfield and Homestake production has been, severally, from $18,000 to near $100,000. The others mentioned are each over $2,000. The total production of the camp will foot up $1,500,000, exclusive of the placer fields of the vicinity.

CHARACTER OF ORE.

The predominating ore of this district is a quartz, impregnated with copper and iron pyrites, and carrying gold in the proportion of one ounce to four or five of silver. Also the ore is found of solid pyrites, generally high in gold and silver. The surface ores, to a depth varying from 50 to 150 feet, are much oxidized and constitute free milling ore. Copper is an important by-product, varying in percentage to the ton from 1 to 20. In some veins nearly free milling ore is the rule, but the most extreme of this variety will give one ton of rich concentrates to each twenty tons of ore. The average ratio of concentration is about ten tons into one. Ore values vary from free milling, $6 and upwards per ton, to heavy sulphide ore, from $30 to $175. The heavy ore is sorted out and sold to the smelters, which also dispose of the concentrates. Average value of these concentrates is $60 per ton, in gold, silver and copper contents. The mining industry of this section is increasing rapidly, and the daily production is, at present writing, near 100 tons per day.

The most important developments are on the Snake mine, with 350-foot shaft and long drifts therefrom; the Opportunity shaft and workings, 300 feet deep; the Richmond shaft and level, 500 feet; the Bonanza tunnel levels, with 450 feet vertical depth gained; the Garfield tunnel level, 500 feet in length, and a number of shafts and workings from 100 to 200 feet in length and depth.

There are a great many claims upon which little work has been done, but which make a good surface showing and warrant the expenditure of some capital to prove their value. They can be purchased at low rates, and may prove great investments. One of the big mines of this district was thus purchased for about $2,500, and with an expenditure of $4,000 was placed upon a paying basis. It would now take about $250,000 to buy that same property. Yet, at the surface, there was nothing to especially indicate its great value. Like the other veins, its course is straight with the accompanying porphyry dyke, and its croppings of ore in average value were low. Such opportunities are here to be found in considerable number. Fortune favors the brave, and more especially in mining matters.

MILLS AND SMELTERS.

Four mills, the Bonanza, Standard, Richmond and the Hopewell, are running constantly on milling and concentrating ore. Their aggregate capacity is 75 tons per day. A copper-matte furnace of 30 tons capacity is kept in full blast on the heavier ores of the camp. This process of fire-concentration has been a great aid, and is of immense future importance. Its full development will come with the advent of the railroad and cheaper fuel. At an expense not exceeding $8 per ton, it reduces an average of 10 tons of heavy ore into one of rich copper-matte. The matte is shipped to Denver smelters and refineries, and is treated there at about the same rate as would be charged for any one ton of the ore thus reduced. An economy of fully $12 per average ton is effected, and ore of too low grade for shipment is made profitable. As the mines are pushed to greater depth the ore grows heavier, and the smelting process which eliminates the silica, and iron and leaves the copper, gold and silver, with some sulphur and little iron in the matte, becomes every year more important. The custom charge for milling is from $2.50 to $5 per ton. The cost of hauling ore from the mines to the mills and smelter is from 60 cents to $1.50 per ton. Miners wages $3 per day. Labor $1.50 to $2.50.

TIMBERS AND FUEL.

Wood is delivered at the mills for $4 per cord. Heavy mining timbers 8 cents per running foot at the mines. Lumber $30 per thousand in Hillsborough. Other supplies incidental to mining are at very reasonable rates.

COLUMBIAN EXHIBIT.

Ores from the principal mines appear in the Miner's Cabin and elsewhere at the Exposition.

REGULARITY OF ORE OCCURRENCE.

Perhaps the most notable feature in the Hillsborough gold mines is the unbroken continuity of the ore veins. In the Opportunity mine, a drift 1,600 feet in length was carried without a break in its average of about one foot thickness of pay ore. Thirty-two hundred feet of drifts in the Bonanza mine show the same conditions, always some ore to go on. Several thousand feet of workings in the Snake and in the Richmond mines still further attest this valuable feature. The ore varies in thickness, of course, but there is always some for the miner to follow, and once having ore you have it always. The end of

one of these ore streaks has not yet been reached. In most of the mines there has been an improvement in the value of the ore manifest as soon as the workings have penetrated to the sulphide level, but very rich surface ore has also been found, and there seems to be no absolute rule in this particular, although the preponderance is in favor of the deep workings.

THE GOLD PLACERS.

An extensive area, comprising several thousand acres, lying east of the lode mines, is known as the placers. Discovered in 1880, this field has ever since been worked for its placer or gulch gold, and has yielded to date over $500,000. It has been worked principally with dry washers, a fan arrangement which saves only very coarse gold. The richest dirt has been hauled four to five miles to the Percha and Animas rivers, on either side. The ground has been open to every one, and only of late has there been any movement toward a profitable development of this rich territory. A company has been organized to pipe water from the Animas, and to work the placers in modern style and on a large scale. Its success cannot be doubted.

MARBLE QUARRIES.

Extensive beds of marble — white, black and variegated — have been opened just north of the gold lode district, and near the Animas River.

LEAD-CARBONATE BELT

Is found along the quartzite dyke before mentioned, along the base of the porphyry hills in which the gold mines of Hillsborough are located. The ore, specimens of which appear in the exhibit, is crystallized lead, sulphate of lead and hard carbonates. This field is still prospective, and no production of large importance has yet been made, but much work is being done and good results are expected. The specimens on exhibit are from the Percha, Sarnia, Big Chief and Flora Temple claims. Manganese and iron ores of value are found in considerable quantity along this belt, also some flint deposits very rich in gold.

PASTORAL AND AGRICULTURAL.

Hillsborough is headquarters for several cattle companies, with herds aggregating 40,000 to 50,000 head. Agricultural interests are small, and confined to fruit growing and pasture in the immediate vicinity. Residence houses are surrounded with pleasant gardens, which are irrigated by windmill pumps.

WARM SPRINGS.

The warm springs, in the valley between Hillsborough and the mines, are provided with commodious bath house, swimming and private baths, and are a great source of health and pleasure to the miners, who attend in great numbers at least once a week. The water is just comfortably warm, and the baths are in constant use the year round.

At Las Palomas, on the Rio Grande, and at Ojo Caliente, north of Grafton, are extensive hot springs and noted health resorts.

CHLORIDE.

Situated twenty miles north of Hermosa, among the foot-hills of the Black Range, is a district of gold and silver bearing fissure veins in porphyry and syenite, and extending into the adjacent limestones. The veins are well defined and of great width, in many instances fully fifty feet. The ore is generally found on the hanging wall, but in this respect there are variations as in other districts.

There are two groups; the upper, known as the bornite district, from the nature of its ore, and the lower district within one-half mile of Chloride; the upper being about twelve miles, and well up on the range. The Silver Monument mine, for instance, is within two miles of the summit.

The principal mines in the upper group are the Silver Monument, Comet, Independent, Black Prince, Black Hawk, White Hawk, Cashier, Small Hopes and Columbus. Of these the Silver Monument has made the largest production, and has been most developed. The main shaft is 445 feet deep, and large bodies of ore appear from the 300-foot level downwards. First-class ore, running from $250 to $400 per ton, appears in kidneys along the pay streak, which are somewhat regular in their occurrence. The bulk of the ore is second-class concentrating, treated at the company's mill. Concentrates are worth from $400 to $600 per ton. They carry from 17 to 35 per cent of copper, and five-tenths of an ounce gold to the ton. Total production of Silver Monument about $125,000. The mine has been worked in very slovenly fashion, with a good deal of the make-shift style, but has paid its own way and development.

On the same lode, running east, are the Comet, Independent, Black Prince and Little Maud, which last is developed by a tunnel level in 400 feet, and which will eventually gain depth of 800 and maintain the same for several thousand feet. On these claims the surface showing of ore, about one foot in width, is the same as on the Silver Monument. The surface ores run about 40 ozs. silver and some in copper. The hardness of the rock to be mined, with the depreciation in the value of silver operate against the working of the surface. To make money it is necessary to get depth, the best ore of the camp being the deepest mined. At a moderate depth ore from the Independent has been shipped that realized about $200 per ton, and carried 9 per cent of copper. All the mines of this group have shipped ore in considerable quantity, and would all be working to-day but for the decline of 40 per cent in the value of silver.

Bornite is the characteristic ore of this upper group, and some of it is very rich in copper; when solid will go about 35 per cent. The country rock of a great part of this region is trachyte, which appears crossing, displacing or overlying the primitive rocks. In the seams of the trachyte, small veins of ore appear which frequently will assay $400 per ton, but of which there is too little to render its pursuit profitable. Besides those mentioned there are many more mines of great interest and promise in this vicinity, and a week's hard work would scarcely suffice to visit them all. The country is wild and rugged, heavily timbered and fairly watered, and has many advantages in these respects which are of consequence in mining. Many of the mines are so situated that tunnels can be run to cut them at considerable depth, thus obviating the use of expensive hoisting machinery until mining has been far advanced, and the quality and nature of the mines are well understood. A very considerable quantity of ore lies upon the dumps of both districts, which will eventually be made

available by some process. The principal stream, Cuchillo Creek, is fed by waters from the South Fork, Chloride gulch, and other tributaries.

GOLD MINES.

In the lower group the St. Cloud, U. S. Treasury and Grey Eagle, and some other claims, are gold quartz veins, in which the ore varies from a few inches to twenty feet wide, with a similar variation in quality. Other mines in near proximity carry lead, silver and copper, but in all there is gold. Much of the ore is free milling. The Chloride camp has received little attention, and the miners have been left to their own resources. The distance to the nearest railroad point, at Engel, is about 50 miles, and freight rates over this road have generally exceeded $10 per ton. More reasonable rates could be obtained with more regular shipments, and in other directions present adverse conditions would be greatly improved by a judicious use of capital. Lixiviation works and some concentrators have been fairly useful, but to be profitable must be worked on a larger scale.

FINE ORE SPECIMENS.

Chloride makes a splendid showing in our exhibit. The brilliant colors of the bornite ores are especially effective and will command attention. The Miner's Cabin owes much of its brightness to the ores contributed from this end of the county. A most casual inspection of the exhibit will tell far more than we can write of the wealth and variety of mineral richness contained in this district.

GRAFTON.

The mineral belt is continuous from Chloride north about 16 miles, and Grafton is the most northerly town in the county. It has built up in connection with the Ivanhoe and Emporia mines, valuable gold producing properties. The veins here are of a hard white quartz, carrying free gold, and gold and silver in sulphide combinations. Apart from a 400-foot shaft on the Ivanhoe, no work of consequence has been done. Judging from the splendid specimens of free gold ores exhibited in this district, there must be great prizes awaiting the skilled investigator. The Great Republic, two miles north of Grafton, has in sight a body of ore 400 feet in length, 100 feet in depth and 4 feet average width, which assays $40 per ton in gold and silver. At present this ore cannot be worked at much profit, and some process of reduction near to the mine is needed. Two miles further north is the Scales group, of fourteen claims, on which some extensive work of development is now being prosecuted.

Between Grafton and Chloride there are many good claims located, principal of which are the Readjuster and Mail Line. All these mines are represented in the Sierra County exhibit and many of them have been regular shippers of ore.

FAIRVIEW

Is a central town and supply depot for the mines of the Black Range, between Chloride and Grafton, and for the mines of the Cuchillo Negro mountains, a parallel range which is identical in age and formation with the Hillsborough group, and which contains some extensive deposits of copper, lead and iron ores, carrying gold and silver in appreciable quantity. These ores are also fairly represented in our exhibit. Float ore, running thousands of dollars in gold to the ton, has been found on the Cuchillo range, but its source is still undiscovered. Prospecting here has been very superficial, and there is a fine field for investigation. Fairview is located in a beautiful and open valley, contains well-built houses and stores, and does a good business with the cattle ranches as well as with the mines.

AGRICULTURAL.

Alamosa, Cuchillo and Palomas are important village centers of the agricultural districts which supply the mining towns. In the vicinity of these towns, and along the Rio Grande valley, an extent of land comprising, perhaps, 4,000 acres has been brought under cultivation by individual and commune irrigation enterprises. Not less than 40,000 acres of the finest bottom lands remain uncultivated. To make these lands available, a scientific system of irrigation and the investment of large capital are necessary. This work, so vital to the future of the county, is fairly under way. The owners of the Armendariz grant, the Las Animas Land and Cattle Company, and the Sierra Land and Cattle Company have inaugurated a gigantic system of canals and irrigation ditches, and are prepared to sell large tracts of land with guarantee of ample water.

In the history of agriculture, the examples of Egypt, India and China are familiar demonstrations of the greater productivity of irrigated lands as compared with those dependent upon the chance of rain. For the past 5,000 years the valley of the Nile has yielded unfailing harvests, and has been maintained in its prolific state by the fertilizing floods of the great river.

The Rio Grande is the Nile of New Mexico; the turbid waters of its annually recurring flood are charged with the richest of fertilizing material, drained from thousands of square miles of the tributary watershed to the north.

As instance of what irrigation is already doing here, we may mention the Kahler ranche of 200 acres, on the Palomas, laid out in orchard and meadow, which is producing four crops of alfalfa yearly, and disposing of the entire yield in the town of Hillsborough, at the average rate of $20 per ton. The fruit crop also finds ready sale in the mining towns at remunerative prices. There are many such patches of land in this county that can be acquired cheaply, and in locations near the mountains irrigation is supplemented by rains.

As the mining industry of Sierra County is constantly and surely increasing, so must the demand for the produce of the farmer. At no time yet has the supply been equal to the demand, and the mining towns are obliged to import from Kansas most of the corn, hay and flour they need, and from Colorado the potatoes and other vegetables, in excess of the present home yield.

Natural reservoir sites are numerous in the side gulches of the main valleys and elsewhere. At comparatively small expense these advantages can be utilized to store the flood waters of the rainy season and turn them into a source of wealth. Several enterprises of this character have already demonstrated the profit and feasibility of such projects, and land otherwise valueless is converted into most desirable property.

COUNTY FINANCES.

Sierra County enjoys an enviable distinction in the West of being out of debt and maintaining her warrants at par. The court-house at Hillsborough is one of the handsomest structures in the Territory, and was built for cash. The roads throughout the county are repaired and maintained on cash contracts, and in their provisions the county commissioners err, if at all, on the side of economy.

In the foregoing brief outline sketch of the resources and advantages of Sierra County, New Mexico, much of interest has necessarily been omitted. To those who desire further information it may be stated that the *Sierra County Advocate*, a newspaper published at Hillsborough, gives reliable weekly reports of the progress of the mining industry, and publishes, from time to time, reviews and descriptions of the more prominent enterprises.

GOLD MINES.

RESOURCES

SIERRA COUNTY, NEW MEXICO

COLUMBIAN EXPOSITION

1893.

SILVER MINES.